# Radish

**ATLANTIC PROVINCES VEGETABLE CROPS GUIDE TO PEST MANAGEMENT 2002 - 2003**

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## Introduction

Radish is a member of the Cruciferae (mustard family). *Raphanus sativus* is a cool season annual (depending on when it is planted). Radishes have been cultivated for thousands of years in both China and the Mediterranean area. Radishes were a common food in Egypt before the building of the pyramids and is one of our most ancient cultivated plants. Generally commercial radishes are approximately 2 cm in diameter and are either red or white. They reach market size in 21 to 28 days (or longer in cool weather). There is also a radish group called *daikon* (Longipinnatus group) which is the Chinese oriental radish. These may grow up to 75 cm long with a diameter of up to 25 cm. These may weigh several kilograms. Radish vary in color from white to black.

Radish is a quick growing cool season root vegetable. The seed will germinate in 3 to 4 days with soil temperatures of 18° to 30°C with good moisture. The minimum temperature for germination is 5°C, the optimum temperature for germination is 30°C. The maximum temperature for germination is 35°C. Germination rates decline sharply when the soil temperature falls below 13°C. The best quality and root shape are obtained when the crop grows and matures at moderate temperatures (10 to 18°C) in intermediate to short day lengths. Radish remain in prime condition for only a few days. Roots of globe varieties tend to elongate and develop poor shape in hot weather when the tops also grow taller

and larger than in cool weather. Long days induce flowering or seed stalks (bolting) and with warm weather the seed stalk may develop so rapidly that no edible root is formed. Radishes become more pungent in hot weather. Roots remain in marketable condition only a short time before becoming pithy. Growth must be continuous and rapid for good quality.

This crop requires a well drained sandy loam or loam with a good supply of organic matter as well as an even moisture supply for good quality (mild, tender and attractive). Rocky or gravelly soils are generally not acceptable especially if bed harvest is to be used. Peat soils are also suitable for production of radish.

Regular radish reach market size in 21 to 28 days so crop can be on the market from June to the end of October. Chinese radish take 50 to 90 days to mature. These become available to market in August and with storage can be marketed into November and December. Yields per hectare depend on the variety and the number of crops per year. Regular radish yield 10,000 to 15,000 kg per hectare. Chinese Radish may yield 30,000 to 44,000 kg per hectare.

Currently radish is a minor crop and markets are quite limited, but there is room for a few growers to supply regular radish, wholesale (bunching and cello pack), and specialty markets with Chinese radish.

*Nutrient Content:* Good source of Vitamin C, potassium and magnesium, plus trace amounts of other nutrients. Four radishes supplies 5 kilocalories.

**Crop Establishment** ▲ to Top

***Seed Treatment*** - accurate spacing is obtained from sized seeds and precision seeders.

***Seeding/Planting*** Seedings at 10 day intervals from early spring will provide a continuous supply. Medium-top strains are preferable for early spring crops and short-top strains are preferable for the longer day period. Seed at 11 to 17 kg per hectare, and up to 20 to 34 kg per hectare for machine harvesting. Seed depth should be 0.5 to 1 cm. Planting deeper then 2 cm produces elongated roots. Space rows 20 to 30 cm apart, or as determined by equipment. Plant stands should be 40 to 50 per meter of row. For machine harvest space rows 10-15 cm apart.

**Crop Management** ▲ to Top

***Spring Crop*** - The seed may be sown in the spring as soon as the soil is workable. Spring frosts, or even heavy snowfalls, after the plants have emerged, usually do not injure the crop seriously. Under favorable weather conditions radish seedlings appear above the ground two or three days after sowing. Sowing at intervals during the spring will provide a continuous harvest.

***Summer and Fall Crops*** - Crops must be well supplied with moisture by irrigation. Some crop loss may occur where temperatures are too high and

bolting occurs. Seeding may continue up to early September. Tunnel houses may be used to extend the season both early in the spring and late in the fall.

**Nutrition** ▲ to Top

ADDITIONS OF LIME AND FERTILIZER OR MANURES SHOULD BE BASED ON RECOMMENDATIONS FROM A SOIL TEST.

Radish require a fertile soil but only moderate amounts of fertility.

***Manures*** - are not generally recommended due to weed seed problems and their unpredictable release of nitrogen for such a short season crop.

***Lime*** - lime should be applied to maintain the soil pH at 7.0.

***Nitrogen*** - a relatively low amount of nitrogen is usually broadcast preplant and incorporated into the soil (up to 60 kg of nitrogen per hectare).

***Phosphorus*** - would be best banded but is usually broadcast prior to planting and incorporated in the soil.

***Potash*** - is usually broadcast before seeding but up to 70 kg per hectare could be banded.

***Sulfur*** - on sandy soils with low organic matter that are intensively cropped an application of gypsum should be considered.

***Micronutrients*** - Apply 0.2% boron in the fertilizer. A foliar spray of boron should be considered on sandy soils high in pH.

***Application method*** - banding of the fertilizer 5 cm below and 5 cm to the side would be ideal for this crop. Rates of fertilizer could be substantially lowered if this practice could be carried out.

**Pests and Pest Control** ▲ to Top

**Weeds**

No herbicides are registered for use on radish. Cultural control methods including crop rotation, stale seedbed, fallowing, cultivation and hand weeding must be used.

Care must be taken to avoid fields where residual herbicides from previous years persist in the soil as crop injury may occur.

**Diseases**

**Clubroot (fungus)**

***Characteristics:*** The fungus causing clubroot in rutabagas and cole crops is usually present in areas where these crops have been grown for many years. Land will remain infested for 7 years or longer after a diseased crop. Certain weeds of the mustard family, such as wild radish and wild mustard (cadlock) will maintain or increase the level of infestation year after year. Every effort should be made to control weeds of this family.

***Control:*** Avoid problem soils. Adjust pH levels to 7 before planting. See the section on Cole Crops in this Guide for more specific information.

**Other Diseases**

Radish is subject to many of the diseases affecting cole crops. Refer to Cole Crop and Rutabaga sections for information on black rot, black leg, downy mildew and common scab.

**Insects**

**Root Maggot**

***Characteristics:*** The adult is a grey fly, half the size of a housefly, which lays white eggs at the base of plants. Legless white maggots, which hatch out of the eggs, tunnel into roots causing rotting of the roots and wilting of the plant.

***Control:*** Apply a soil insecticide at planting or carefully apply fabric floating mulches ensuring no flies get under the mulch.

**Flea Beetles**

***Characteristics:*** Flea beetle adults are 1.5 to 3 mm long, black or bronze beetles. Their hind legs are well developed for jumping. The white larvae are in the soil, and therefore seldom seen. Depending on species, there are one or two generations a year. Adults overwinter in the soil. They emerge in the spring and begin feeding on the foliage. Eggs are laid on or near the roots where larvae feed. Mature larvae pupate in the soil near the host plant. The second appearance of adults is in early August for single-generation species. Last-generation adults feed on foliage until fall, when they return to the soil to overwinter.

***Control:*** Heavy damage can occur quickly, so prompt attention is necessary when an infestation is noticed.

**Aphids**

***Characteristics:*** Aphids are small, soft-bodied, slow-moving insects. They are often found in large colonies on the undersurface of leaves. A colony consists of winged and wingless adults and various sizes of nymphs. Aphids may be black, yellow or pink, but mostly are various shades of green. Aphids feed by sucking plant sap. Saliva injected while feeding may carry plant viruses or may be toxic to the host plant. Feeding by large numbers discolors foliage, curls leaves, and

damages developing buds. The plants may be covered by a sticky substance, honey dew, which is excreted by the aphids.

***Control:*** Apply recommended materials when aphids are numerous.

SEE SPECIFIC CONTROLS IN THE ATLANTIC PROVINCES "GUIDE TO PEST MANAGEMENT" FOR VEGETABLE CROPS.

**Harvesting and Handling** ▲ to Top

Harvesting operations consist of pulling, topping, washing, grading, bunching, and packing. All small, diseased, and cracked roots are discarded. Bunching is frequently done in the field but the practice is seldom practiced except for local market. Long-rooted cultivars are bunched in fours and fives, while round and globular-rooted cultivars are tied in bunches of 6 to 12. Baskets, hampers, and crates are the principal containers. For long-distance shipment, cracked ice is placed in the middle and top of the containers, and the radishes are shipped under refrigeration.

**Storage and Conditioning** ▲ to Top

The recommended storage temperature is 0ºC with a relative humidity of 95% to 100%. Topped radishes packaged in perforated plastic bags will keep for 3 to 4 weeks. Bunched radishes will keep 1 to 2 weeks.

**Bibliography** ▲ to Top

(See General References)

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Diseases and Pests of Vegetable Crops in Canada. 1994. The Canadian Phytopathological Society and the Entomological Society of Canada. pp 92 - 123 and pp 421 - 435.

The National Garden Bureau. Factsheet - Year of the Radish. 1996. 6 pp.

Prepared by: Horticulture Section, Production Technology Branch, Nova Scotia Department of Agriculture & Marketing on behalf of APASCC and members:

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| PEST | PESTICIDE (Formulation) | RATE Product | DAYS TO HARVEST | REMARKS |
|---|---|---|---|---|
| ***Weeds*** ▲ to Top | | | | |
| **Preplant**<br><br>Perennial | ROUNDUP 356 Sn | 2.5 to 7.0 L/ha | - | Apply in the fall or spring prior to planting. Annual weed control programs will be necessary to control weeds germinating after planting. For |

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|---|---|---|---|---|
| Weeds including quackgrass | TOUCHDOWN 480 | 2.5 to 7.0 L/ha | - | quackgrass control apply to actively growing quackgrass when at least 4 new leaves are present. The low rate (2.5 L/ha) will provide a minimum of one season control, while higher rates (4.75 to 7 L/ha) will provide longer term control. The low rate of Roundup should be applied in 50 to 100 L/ha water. If higher water volumes are used add a suitable surfactant. Wait 72 hours before plowing under. Best control of quackgrass is obtained when these herbicides are applied in the fall. |
| | GLYFOS | 2.5 to 7.0 L/ha | - | |
| | ROUNDUP TRANSORB | 2.5 to 7.0 L/ha | - | |
| **Preemergence**<br><br>Stale Seedbed Technique | GRAMOXONE 200 Sn | 2.75 to 5.5 L/ha | - | Apply in 300 to 1100 L of water/ha to foliage of the emerged weeds but before the crop has emerged. Use Gramoxone for best control of grasses. |
| | REGLONE 200 Sn | 2.75 to 5.5 L/ha | - | |
| ***Insects*** ▲ to Top | | | | |
| Root maggots | DIAZINON 5 G | 1.75 kg per 1000 m row | - | Apply in seed furrow at planting time. |
| | LORSBAN 4E | 85 ml per 380 L of water | 21 | Apply 380 L per 1000 m of row as a drench at planting. |
| Flea beetles or aphids | DIAZINON 500 EC | 1.1 L/ha | 10 | Apply in sufficient water to ensure coverage. Repeat as necessary. |
| | DIAZINON 50 WP | 1.0 kg/ha | 10 | |
| | DZN 600EW | 915 mL/ha | 10 | |
| | MALATHION 500 EC | 1.8 to 2.0 L/ha | 7 | Aphids only. |
| | MALATHION 25 WP | 2.25 to 5.5 kg/ha | 7 | |
| | METHOXYCHLOR 50 WP | 1.7 to 5.0 kg/ha | 7 | Flea beetles only. Apply at first sign of infestation. Do not feed treated crop or refuse to livestock. |
| | SEVIN 85 WP | 0.75 - 1.25 kg/ha | 7 | Flea beetle control only. |
| | SEVIN 80 SP | 0.75 to 1.5 kg/ha | 7 | |
| | SEVIN 50 WP | 1.1 to 2.5 kg/ha | 7 | |
| | SEVIN L 420 SU | 1.25 to 2.0 L/ha | 7 | |
| | SEVIN XLR Plus | 2.5 to 5.25 L/ha | 7 | |